

WHAT IS CLAIMED IS:

1. In a high intensity discharge lamp having an arc tube supported within the outer lamp envelope wherein one or more arc tube leads are electrically coupled to a lamp base (adapted to receive electrical power from an external power source), the improvement wherein the electrical coupling between at least one of the arc tube leads and the lamp base includes no welds.

2. The HID lamp of Claim 1 wherein the electrical coupling between each of the arc tube leads and the lamp base includes no welds.

3. The HID lamp of Claim 1 wherein the electrical coupling between at least one of the arc tube leads and the lamp base comprises an elongated wire forming a coil adjacent one or both ends thereof.

4. The HID lamp of Claim 3 wherein a portion of one of said arc tube leads is received within at least a portion of one of said coils so that said portion of the coil extends axially around said portion of the arc tube lead, whereby at least a section of said portion of the coil is crimped around the arc tube lead to enhance the integrity of the electrical coupling between said wire and said arc tube lead.

5. The HID lamp of Claim 3 wherein the lamp base is electrically coupled to at least one stem lead having a portion thereof received within at least a portion of one of said coils so that said portion of the coil extends axially around said portion of the stem lead, whereby at least a section of said portion of the coil is crimped around the stem lead

to enhance the integrity of the electrical coupling between said wire and said stem lead.

6. The HID lamp of Claim 5 wherein a portion of one of said arc tube leads is received within at least a portion of one of said coils so that said portion of the coil extends axially around said portion of the arc tube lead, whereby at least a section of said portion of the coil is crimped around the arc tube lead to enhance the integrity of the electrical coupling between said wire and said arc tube lead.

7. The HID lamp of Claim 3 wherein said wire forms a coil adjacent both ends thereof, a portion of one of said arc tube leads being received within at least a portion of one of said coils so that said portion of the coil extends axially around said portion of the arc tube lead, the lamp base being electrically coupled to at least one stem lead having a portion thereof received within at least a portion of the other of said coils so that said portion of the coil extends axially around said portion of the stem lead, whereby at least a section of said portions of said coils is crimped around the lead received therein to enhance the integrity of the electrical coupling between said wire and said leads.

8. In a high intensity discharge lamp including an outer lamp envelope having an arc tube mounted therein and one or more electrical connections for operating the arc tube, the improvement wherein one or more of the electrical connections are weldless.

9. In a high intensity discharge lamp including an arc tube having one or more leads electrically coupled to an electrical power receiving lamp base, the improvement wherein the electrical coupling between at least one of the arc tube leads and the lamp

base comprises an elongated wire forming a coil adjacent one or both ends thereof.

10. The HID lamp of Claim 9 wherein said wire forms a coil adjacent both ends thereof.

11. The HID lamp of Claim 9 wherein said coil is adapted to receive therein a portion of one of said arc tube leads so that at least a portion of said coil extends axially around the portion of the arc tube lead received therein, at least a section of said portion of said coil being crimped around the arc tube lead.

12. The HID lamp of Claim 9 wherein said base comprises one or more stem leads, said coil being adapted to receive therein a portion of one of said stem leads so that at least a portion of said coil extends axially around the portion of the stem lead received therein, at least a section of said portion of said coil being crimped around the stem lead.

13. The HID lamp of Claim 12 wherein said wire terminates in a coil at both ends, said other coil being adapted to receive therein a portion of one of said arc tube leads so that at least a portion of said coil extends axially around the portion of the arc tube lead received therein, at least a section of said portion of said coil being crimped around the arc tube lead.

14. The HID lamp of Claim 12 wherein said coil comprises an uncrimped portion adjacent the uncoiled portion of the wire forming said coil.

15. The HID lamp of Claim 14 wherein said uncrimped portion comprises about one half of the coil.

16. The HID lamp of Claim 9 further comprising a plurality of wires and a pair of stem leads, each stem lead being electrically coupled to said base and having at least a portion of a coil of one of said wires crimped around a portion thereof.

17. The HID lamp of Claim 16 further comprising a plurality of wires and a pair of stem leads, each stem lead being electrically coupled to said base and having at least a portion of a coil of one of said wires crimped around a portion thereof, the other end of each of said wires forming a coil being at least partially crimped around a portion of one of said arc tube leads.

18. The HID lamp of Claim 9 further comprising a plurality of wires, wherein each arc tube lead includes a portion thereof having at least a portion of a coil of one of said wires crimped therearound.

19. The HID lamp of Claim 9 further comprising a plurality of wires wherein at least a portion of a coil formed in one of said wires is crimped around at least a portion of a coil formed in one or more of the other wires.

20. The HID lamp of Claim 9 further comprising a frame...

21. An HID lamp comprising:

- a. ✓ an outer lamp envelope having an opening at one end;
- b. ✓ an arc tube mounted within said outer lamp envelope; and
- c. a mounting structure for supporting said arc tube and providing weldless electrical coupling between the arc tube and a source of electrical power, said mounting

structure comprising:

- i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and first and second stem leads each providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;
- ii. an elongated frame supported at one end by said stem assembly;
- iii. a first arc tube clip supported by said frame, said first arc tube clip supporting the end of the arc tube nearer the stem assembly;
- iv. a second arc tube clip supported by said frame, said second arc tube clip supporting the other end of the arc tube;
- v. a first electrical connector electrically coupling the first stem lead to a first arc tube lead; and
- vi. a second electrical connector electrically coupling the second stem lead to a second arc tube lead.

22. The HID lamp of Claim 21 wherein said first and second electrical connectors comprises an elongated electrically conducting wire forming a coil adjacent each end thereof, one of said coils of each of said connectors being adapted to receive a portion of one of the stem leads therein, the other of said coils of each of said connectors being adapted to receive a portion of one of said arc tube leads therein, at least a portion of each coil being crimped around the lead received therein.

23. The HID lamp of Claim 22 wherein each coil having a portion of a stem lead received therein comprises an uncrimped portion adjacent the uncoiled portion of the wire forming said coil.

24. The HID lamp of Claim 21 wherein said mounting structure includes no weld between said frame and said stem assembly.

25. The HID lamp of Claim 21 wherein said mounting structure includes no weld between said frame and said first or second arc tube clip.

26. An HID lamp comprising:

- a. ✓ an outer lamp envelope having an opening at one end;
- b. ✓ an arc tube mounted within said outer lamp envelope;
- c. a generally tubular shroud surrounding at least a portion of said arc tube;
and

d. a mounting structure for supporting said arc tube and providing weldless electrical coupling between the arc tube and a source of electrical power, said mounting structure comprising:

- i. ✓ a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and first and second stem leads each providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;
- ii. ✓ an elongated frame supported at one end by said stem assembly;

- iii. a first shroud cap supported by said frame, said first shroud cap supporting the end of the arc tube and shroud nearer the stem assembly;
- iv. a second shroud cap supported by said frame, said second shroud cap supporting the other end of the arc tube and shroud;
- v. ✓ a first electrical connector electrically coupling the first stem lead to a first arc tube lead; and
- vi. a second electrical connector electrically coupling the second stem lead to a second arc tube lead.

27. The HID lamp of Claim 26 wherein said first and second electrical connectors comprises an elongated electrically conducting wire forming a coil adjacent each end thereof, one of said coils of each of said connectors being adapted to receive a portion of one of the stem leads therein, the other of said coils of each of said connectors being adapted to receive a portion of one of said arc tube leads therein, at least a portion of each coil being crimped around the lead received therein.

28. The HID lamp of Claim 27 wherein each coil having a portion of a stem lead received therein comprises an uncrimped portion adjacent the uncoiled portion of the wire forming said coil.

29. The HID lamp of Claim 26 wherein said mounting structure includes no weld between said frame and said stem assembly.

30. The HID lamp of Claim 26 wherein said mounting structure includes no weld between said frame and said first or second shroud cap.

31. In a structure for mounting an arc tube within the outer envelope of an HID lamp, the structure including an elongated frame supported at one end by a stem assembly, the improvement wherein there being no weld between the frame and the stem assembly.

32. A structure for mounting an arc tube within the outer envelope of an HID lamp, said structure comprising:

an elongated frame; and

a stem assembly comprising:

- i. a stem adapted to be supported by the base of the lamp, and
- ii. a stem clamp supported by said stem, said stem clamp comprising one or more frame retaining tabs,

wherein said frame is supported at one end by engagement with one or more of said frame retaining tabs.

33. The mounting structure of Claim 32 wherein said frame comprises a wire forming an end portion and two substantially parallel legs extending in substantially the same direction from said end portion.

34. The mounting structure of Claim 32 wherein said stem clamp comprises a generally tubular member having two pair of frame retaining tabs, each pair of tabs being

positioned opposite the other about the curved surface of said stem clamp, each of said tabs forming an opening adapted to receive a portion of said frame therethrough.

35. The mounting structure of Claim 34 wherein said frame comprises a wire forming an end portion and two substantially parallel legs extending in substantially the same direction from said end portion, a portion of one of said legs being received through the openings formed by one pair of said frame retaining tabs, a portion of the other of said legs being received through the openings formed by the other pair of said frame retaining tabs.

36. The mounting apparatus of Claim 34 wherein each of said tabs forms an aperture.

37. The mounting structure of Claim 32 wherein said frame comprises a wire forming an end portion and a leg extending from said end portion, said leg having a swaged portion adjacent the terminal end thereof.

38. The mounting structure of Claim 32 wherein said stem clamp comprises a generally tubular member having a pair of frame retaining tabs, each of said tabs forming an opening adapted to receive a portion of said frame therethrough.

39. The mounting structure of Claim 38 wherein one of said tabs forms an aperture and the other of said tabs forms a slot.

40. The mounting structure of Claim 39 wherein said frame comprises a wire forming an end portion and a leg extending from said end portion, said leg having a

swaged portion adjacent the terminal end thereof, a portion of said leg being received through said aperture and said swaged portion being received in said slot.

41. A structure for mounting an arc tube in the outer envelope of a high intensity discharge lamp comprising an elongated frame supporting a pair of spaced apart arc tube clips along the length thereof, (each of said clips being adapted to support one end of the arc tube supported therebetween,) wherein there being no weld between said frame and at least one of said clips.

42. The mounting structure of Claim 41 wherein there being no welds between the frame and either of said clips.

43. The structure of Claim 41 further comprising a stem assembly, said frame being supported at one end by said stem assembly wherein there being no welds between said frame and said stem assembly.

44. The structure of Claim 41 further comprising a getter cap supported from one of said clips wherein there being no weld between said getter cap and said one of said clips.

45. A structure for mounting an arc tube within the outer envelope of a high intensity discharge lamp, said structure comprising:

an elongated frame having one or more swaged portions along the length thereof;
and

an arc tube clip comprising a frame retaining tab at one end and an arc tube

retaining tab at the other end thereof, said frame retaining tab forming a slot having a swaged portion of said frame received therein, said arc tube retaining tab being adapted to receive therein one end of the arc tube.

46. The mounting structure of Claim 45 wherein said swaged portion of said frame being retainably received in said slot formed by said frame retaining tab.

47. The mounting structure of Claim 46 wherein said frame retaining tab being crimped at least partially around said swaged portion of said frame received therein.

48. The mounting structure of Claim 45 wherein said frame comprises a pair of swaged portions along the length thereof.

49. The mounting structure of Claim 48 wherein said clip comprises a pair of frame retaining tabs at one end, each of said tabs forming a slot having a one of said swaged portions of said frame received therein.

50. The mounting structure of Claim 45 wherein said clip comprises a pair of frame retaining tabs at one end, each of said tabs forming a slot having a swaged portion of said frame received therein.

51. The mounting structure of Claim 45 wherein said frame comprises a wire forming an end portion and a leg extending from said end portion, said leg having one or more swaged portions along the length thereof.

52. The mounting structure of Claim 45 comprising a pair of arc tube clips, each arc tube clip comprising a frame retaining tab at one end and an arc tube retaining

tab at the other end thereof, each of said frame retaining tabs forming a slot having a swaged portion of said frame received therein, each of said arc tube retaining tabs being adapted to receive therein one end of the arc tube.

53. The mounting structure of Claim 52 wherein said frame comprises a wire forming an end portion and a leg extending from said end portion, said leg having two pair of swaged portions along the length thereof, each of said clips comprising a pair of frame retaining tabs retainably receiving therein one of said pairs of swaged portions.

54. The mounting structure of Claim 45 wherein said arc tube clip comprises a getter cap retaining tab forming one or more apertures adapted to retainably receive the mounting wire of a getter cap.

55. A structure for mounting an arc tube and shroud in the outer envelope of a high intensity discharge lamp comprising an elongated frame supporting a pair of spaced apart shroud caps along the length thereof, each of said shroud caps being adapted to support one end of the arc tube and shroud supported therebetween, wherein there being no weld between said frame and at least one of said shroud caps.

56. The mounting structure of Claim 55 wherein there being no welds between the frame and either of said shroud caps.

57. The structure of Claim 55 further comprising a stem assembly, said frame being supported at one end by said stem assembly wherein there being no welds between said frame and said stem assembly.

58. The structure of Claim 55 further comprising a getter cap supported from one of said clips wherein there being no weld between said getter cap and said one of said clips.

59. The structure of Claim 55 wherein said frame comprises a pair of substantially parallel spaced apart elongated legs supporting said pair of shroud caps therebetween.

60. A structure for mounting an arc tube and shroud within the outer envelope of a high intensity discharge lamp, said structure comprising:

a frame comprising a pair of substantially parallel spaced apart elongated legs, each of said legs having one or more swaged portions along the length thereof; and

a shroud cap comprising a pair of spaced apart frame retaining tabs, each of said frame retaining tabs forming a slot, one of said frame retaining tabs receiving in the slot formed thereby a swaged portion of one of said legs, the other of said frame retaining tabs receiving in the slot formed thereby a swaged portion of the other of said legs, said shroud cap being adapted to support one end of the arc tube and shroud.

61. The mounting structure of Claim 60 wherein said swaged portions of said frame being retainably received in said slots formed by said tabs.

62. The mounting structure of Claim 61 wherein each of said frame retaining tabs being crimped at least partially around said swaged portion of said frame received therein.

63. The mounting structure of Claim 60 further comprising an arc tube receiving tab forming an opening adapted to receive a portion of one end of the arc tube therethrough.

64. The mounting structure of Claim 60 wherein said shroud cap comprises a generally circular surface having each tab of said pair of frame retaining tabs formed opposite the other along the generally circular edge thereof, one or more shroud retaining tabs formed along the generally circular edge thereof, and an arc tube receiving tab formed between said frame retaining tabs at about the center of said cap.

65. The mounting structure of Claim 64 wherein said shroud retaining tabs extend from the generally circular edge of said surface and being substantially normal to said surface.

66. The mounting structure of Claim 64 further comprising a getter cap retaining tab formed along the generally circular edge of said surface and extending away from the plane of said surface.

67. The mounting structure of Claim 60 wherein said frame comprises a wire forming an end portion and a pair of substantially parallel legs extending from said end portion, each of said legs having one or more swaged portions along the length thereof.

68. The mounting structure of Claim 60 comprising a pair of spaced apart shroud caps supporting the arc tube and shroud cap therebetween.

69. The mounting structure of Claim 60 wherein said shroud cap further

comprises a getter cap retaining tab forming one or more apertures adapted to retainably receive the mounting wire of a getter cap.

70. A getter cap comprising a cap portion adapted to support the getter material and a mounting portion, said mounting portion being supported by a mounting structure within the outer envelope of a high intensity discharge lamp, wherein there being no weld between said getter cap and said mounting structure.

71. A structure for mounting an arc tube within the outer envelope of an HID lamp, said structure comprising:

a frame comprising a pair of substantially parallel elongated legs, each of said legs

having a tab retaining portion adjacent the terminal end thereof; and

a stem assembly comprising:

i. a stem adapted to be supported by the base of the lamp, and

ii. a heat shield supported by said stem, said heat shield comprising a pair of frame retaining tabs,

wherein said frame is supported at one end by engagement of one of said tab retaining portions thereof with one of said frame retaining tabs and the other of said tab retaining portions thereof with the other of said frame retaining tabs.

72. The mounting structure of Claim 71 wherein said heat shield comprises a generally planar shield portion and a pair of frame retaining tabs formed on opposite sides of said shield portion, each of said tabs overlying a portion of said shield portion forming

a gap therebetween, one of said gaps retaining therein the tab retaining portion of one of said legs and the other of said gaps retaining therein the tab retaining portion of the other of said legs, each of said tabs forming a slot receiving therein a portion of said leg adjacent the tab retaining portion thereof.

73. An HID lamp comprising:

- a. an outer lamp envelope having an opening at one end;
 - b. an arc tube mounted within said outer lamp envelope;
 - c. a generally tubular shroud surrounding at least a portion of said arc tube;
- and

d. a mounting structure for supporting said arc tube and providing electrical coupling between the arc tube and an electrical power receiving lamp base, said mounting structure comprising:

- i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and first and second stem leads each providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;
- ii. an elongated frame weldlessly supported at one end by said stem assembly;
- iii. a first shroud cap weldlessly supported by said frame, said first shroud cap supporting the end of the arc tube and shroud nearer the

stem assembly;

- iv. a second shroud cap weldlessly supported by said frame, said second shroud cap supporting the other end of the arc tube and shroud;
- v. a first electrical connector electrically coupling the first stem lead to a first arc tube lead; and
- vi. a second electrical connector electrically coupling the second stem lead to a second arc tube lead.

74. The HID lamp of Claim 73 wherein the electrical coupling between said arc tube and the electrical power receiving lamp base includes no welds.

75. An HID lamp comprising:

- a. an outer lamp envelope having an opening at one end;
- b. an arc tube mounted within said outer lamp envelope;
- c. a generally tubular shroud surrounding at least a portion of said arc tube;
and
- d. a mounting structure for supporting said arc tube and said shroud and providing electrical coupling between the arc tube and an electrical power receiving lamp base, said mounting structure comprising:
 - i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and stem clamp, said stem clamp comprising two pair of frame retaining tabs each forming an

aperture;

- ii. an elongated frame comprising a pair of substantially parallel legs, a portion of each leg adjacent the terminal end thereof being received through the apertures formed by one pair of said frame retaining tabs, each leg having swaged portions along the length thereof;
- iii. a pair of shroud caps supported by said frame, each of said shroud caps comprising a pair of frame retaining tabs, each of said tabs forming a slot, one of said tabs retaining in the slot formed thereby a swaged portion of one of said legs, the other of said tabs retaining in the slot formed thereby a swaged portion of the other of said legs, the pair of said shroud caps supporting said arc tube and said shroud therebetween.

76. An HID lamp comprising:

- a. an outer lamp envelope having an opening at one end;
- b. an arc tube mounted within said outer lamp envelope; and
- c. a mounting structure for supporting said arc tube and providing electrical coupling between the arc tube and an electrical power receiving lamp base, said mounting structure comprising:
 - i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and first and second stem leads each

providing an electrical connection from the interior of the lamp envelope to the exterior of the lamp envelope;

- ii. an elongated frame weldlessly supported at one end by said stem assembly;
- iii. a first arc tube clip weldlessly supported by said frame, said first arc tube clip supporting the end of the arc tube nearer the stem assembly;
- iv. a second arc tube clip weldlessly supported by said frame, said second arc tube clip supporting the other end of the arc tube;
- v. a first electrical connector electrically coupling the first stem lead to a first arc tube lead; and
- vi. a second electrical connector electrically coupling the second stem lead to a second arc tube lead.

77. The HID lamp of Claim 76 wherein the electrical coupling between said arc tube and the electrical power receiving lamp base includes no welds.

78. An HID lamp comprising:

- a. an outer lamp envelope having an opening at one end;
- b. an arc tube mounted within said outer lamp envelope; and
- c. a mounting structure for supporting said arc tube and providing electrical coupling between the arc tube and an electrical power receiving lamp base, said mounting structure comprising:

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- i. a stem assembly mounted at the open end of said lamp envelope, said stem assembly including a stem and stem clamp, said stem clamp comprising a pair of frame retaining tabs, one tab forming an aperture and the other tab forming a slot;
 - ii. an elongated frame comprising a leg having swaged portions along the length thereof, said aperture receiving therethrough a portion of the leg, said slot retainably receiving therein a swaged portion of said leg;
 - iii. a pair of arc tube clips supported by said frame, each of said arc tube clips comprising a pair of frame retaining tabs, each of said tabs forming a slot retaining therein a swaged portion of said leg, the pair of said arc tube clips supporting said arc tube therebetween.

79. A method of axially positioning an arc tube within an outer envelope of an HID lamp, said method comprising the steps of:

- providing a frame for supporting the arc tube;
- marking the frame along the length thereof;
- supporting the arc tube from the elongated frame.

80. A method of positioning an arc tube within the outer envelope of an HID lamp comprising the steps of:

- (i) providing an elongated frame having swaged portions along the length

thereof;

(ii) supporting a pair of arc tube support members from the swaged portions of the frame; and

(iii) supporting the arc tube between the support members,

whereby the axial position of the arc tube within the outer lamp envelope is determined by the position of the swaged portions of the frame.

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